AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A magnetic disk comprising a disk substrate having a substrate surface and an exchange coupling film on said substrate surface, said exchange coupling film comprising a first magnetic layer, a second magnetic layer farther from said substrate surface than said first magnetic layer, and a spacer layer interposed between said first and said second magnetic layers and having a principal surface nearer to said second magnetic layer than said first magnetic layer, said spacer layer having a thickness of 1.2 nm or less, said principal surface of the spacer layer having a surface roughness Ra which is not greater than the thickness of said spacer layer, where Ra is representative of a center-line-mean roughness, said exchange coupling film [causing] possessing antiferromagnetic coupling such that [said first magnetic layer has a magnetization direction antiparallel to that of said second magnetic layer] magnetization directions of said first and said second magnetic layers are anti-parallel.

2. (currently amended): A magnetic disk comprising a disk substrate having a substrate surface and an exchange coupling film on said substrate surface, said exchange coupling film comprising a first magnetic layer, a second magnetic layer farther from said substrate surface than said first magnetic layer, and a spacer layer interposed between said first and said second magnetic layers and having a principal surface nearer to said second magnetic layer than said first magnetic layer, said principal surface of the spacer layer having a surface roughness Ra which is not greater than a thickness of said spacer layer and is not greater than 0.5 nm, where Ra is representative of a center-line-mean roughness, said exchange coupling film [causing] possessing antiferromagnetic coupling such that [said first magnetic layer has a magnetization direction antiparallel to that of said second magnetic layer] magnetization directions of said first and said second magnetic layers are anti-parallel.

3. (withdrawn): A magnetic disk comprising a disk substrate having a substrate surface and an exchange coupling film on said substrate surface, said exchange coupling film comprising

a first magnetic layer, a second magnetic layer farther from said substrate surface than said first magnetic layer, and a spacer layer interposed between said first and said second magnetic layers, said substrate surface of the disk substrate having a surface roughness Ra which is not greater than a thickness of said spacer layer, where Ra is representative of a center-line-mean roughness.

4. (withdrawn): A magnetic disk comprising a disk substrate having a substrate surface and an exchange coupling film on said substrate surface, said exchange coupling film comprising a first magnetic layer, a second magnetic layer farther from said substrate surface than said first magnetic layer, and a spacer layer interposed between said first and said second magnetic layers, said substrate surface of the disk substrate having a surface roughness Ra which is not greater than 0.5 nm, where Ra is representative of a center-line-mean roughness.

5. (previously presented): A magnetic disk as claimed in claim 1, wherein said spacer layer is made of a high-melting-point material higher in melting point than a material of any one of said first and said second magnetic layers.

6. (previously presented): A magnetic disk as claimed in said spacer layer is directly deposited on said first magnetic layer, said second layer being directly deposited on said spacer layer.

7. (cancelled)

8. (withdrawn): A method of producing a magnetic disk comprising a disk substrate having a substrate surface and an exchange coupling film on said substrate surface, said exchange coupling film comprising a first magnetic layer, a second magnetic layer farther from said substrate surface than said first magnetic layer, and a spacer layer interposed between said first and said second magnetic layers, said method comprising the steps of:

preliminarily obtaining a relationship between a surface roughness of the substrate surface of said disk substrate and attenuation owing to thermal fluctuation when a signal is recorded on said magnetic disk;

determining a desired surface roughness of the substrate surface of said disk substrate with reference to said relationship so that the attenuation of said signal has a desired level;

producing the disk substrate having the substrate surface which has the desired surface roughness; and

forming the exchange coupling film on the substrate surface of the disk substrate which has the desired surface roughness.

9. (withdrawn): A method of producing a magnetic disk comprising a disk substrate having a substrate surface and an exchange coupling film on said substrate surface, said exchange coupling film comprising a first magnetic layer, a second magnetic layer farther from said substrate surface than said first magnetic layer, and a spacer layer interposed between said first and said second magnetic layers and having a principal surface nearer to said second magnetic layer than said first magnetic layer, said method comprising the step of:

depositing said spacer layer by sputtering so that said principal surface of the spacer layer has a surface roughness Ra which is not greater than a thickness of said spacer layer, where Ra is representative of a center-line-mean roughness.

10. (withdrawn): A method of producing a magnetic disk as claimed in claim 9, wherein said spacer layer is deposited by sputtering at a deposition rate within a range not higher than 1.2 nm/sec.

11. (previously presented): A magnetic disk as claimed in claim 1, wherein said spacer layer is made of a nonmagnetic material.

12. (previously presented): A magnetic disk as claimed in claim 1, further comprising a third magnetic layer formed on said exchange coupling film, wherein said second magnetic layer is used as a layer for controlling exchange coupling and crystal orientation of said third magnetic layer.

13. (previously presented): A magnetic disk as claimed in claim 12, further comprising an additional layer formed between said second and said third magnetic layers for promoting the crystal orientation of said third magnetic layer.

14. (previously presented): A magnetic disk as claimed in claim 12, wherein said third magnetic layer used as a magnetic recording layer has an average grain size not greater than 10 nm.

15. (previously presented): A magnetic disk as claimed in claim 1, wherein said second magnetic layer used as a magnetic recording layer has an average grain size not greater than 10 nm.

16. (previously presented): A magnetic disk as claimed in claim 2, wherein said spacer layer is made of a high-melting-point material higher in melting point than a material of any one of said first and said second magnetic layers.

17. (previously presented): A magnetic disk as claimed in claim 2, wherein said spacer layer is directly deposited on said first magnetic layer, said second layer being directly deposited on said spacer layer.

18. (previously presented): A magnetic disk as claimed in claim 2, wherein said spacer layer is made of a nonmagnetic material.

19. (previously presented): A magnetic disk as claimed in claim 2, further comprising a third magnetic layer formed on said exchange coupling film, wherein said second magnetic layer is used as a layer for controlling exchange coupling and crystal orientation of said third magnetic layer.

20. (previously presented): A magnetic disk as claimed in claim 19, further comprising an additional layer formed between said second and said third magnetic layers for promoting the crystal orientation of said third magnetic layer.

21. (previously presented): A magnetic disk as claimed in claim 19, wherein said third magnetic layer used as a magnetic recording layer has an average grain size not greater than 10 nm.

22. (previously presented): A magnetic disk as claimed in claim 2, wherein said second magnetic layer used as a magnetic recording layer has an average grain size not greater than 10 nm.